

CLAIMS

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1. A method for computer controlled production of a hearing aid housing with a face plate having engaging means for receiving and holding a hearing aid component, and a shell that is matched to the auditory canal of a user, comprising the steps of:

5 acquiring data representing the shape of the auditory canal,

forming a three-dimensional model of the shell in a computer based on the data, and

producing the shell and the face plate based on the model.

2. A method according to claim 1, further comprising the step of selecting a junction contour encircling the shell for positioning of a junction between the hearing aid shell and the face plate.

3. A method according to claim 1, further comprising the steps of including the junction contour in a face plate model, and transferring data representing the contour to a numerically controlled machine that automatically cuts a separately manufactured face plate along a contour that matches the junction contour.

4. A method according to claim 2, wherein the face plate comprises positioning means for engaging with corresponding positioning means of the shell so that the circumference of the face plate matches the junction contour of the shell when the face plate positioning means engage with the shell positioning means.

5. A method according to claim 4, wherein the face plate positioning means comprise at least one face plate protrusion at the inner surface of the face plate, wherein the shell positioning means comprise indentations that are adapted to receive and match the at least one face plate protrusion, and further comprising the step of cutting the face plate along the junction contour so that it matches the junction contour when the at least one face plate protrusion are received by the mating indentations of the shell whereby correct assembly of the face plate and the shell is facilitated.

6. A method according to claim 4, wherein the face plate positioning means comprise at least one face plate protrusion at the inner surface of the face plate terminating at the circumference of the face plate at a distance from the circumference that is substantially

equal to the thickness of the shell at the junction contour, and wherein the shell positioning means are constituted by the shell at the junction contour.

- 5 7. A method according to claim 6, wherein the shell positioning means comprise protrusions at the junction contour extending inwardly towards the interior of the shell for reception and holding corresponding face plate protrusions.
8. A method according to claim 2, further comprising the steps of forming a three-dimensional model of the face plate matching the shell at the selected junction contour, integrating the face plate model and the shell model into one three-dimensional model of the hearing aid housing, and producing the hearing aid housing with an integrated face plate based on the model of the hearing aid housing.
- 10 9. A method according to claim 1, further comprising the steps of selecting shape, dimensions, and position of at least one microphone opening in the face plate and including a model of the at least one microphone opening in the face plate model.
- 15 10. A method according to claim 9, further comprising the step of calculating directional characteristics of microphones positioned at corresponding microphone openings, respectively, of the at least one microphone opening and selecting positions of the respective microphone openings that correspond to a desired directional characteristic.
- 20 11. A method according to claim 1, further comprising the steps of selecting shape, dimensions, and position of a battery opening in the face plate facilitating insertion and removal of a battery, and including a model of the opening in the face plate model.
12. A method according to claim 1, wherein the shell is produced with means for vibration absorbing suspension of the receiver.
13. A method according to claim 1, wherein the shell is produced from a colorless material.
- 25 14. A method according to claim 1, further comprising the step of coloring the shell in a coloring substance of a desired color.
15. A method according to claim 1, further comprising the step of polishing the shell in a polishing cylinder.

16. A method for computer controlled production of a hearing aid housing with a face plate having engaging means for receiving and holding a hearing aid component, and a shell that is matched to the auditory canal of a user, comprising the steps of:

acquiring data representing the shape of the auditory canal,

5 forming a three-dimensional model of the shell in a computer based on the data,

selecting a junction contour encircling the shell for positioning of a junction between the hearing aid shell and the face plate,

including the junction contour in a face plate model, and transferring data representing the contour to a numerically controlled machine that automatically cuts a separately
10 manufactured face plate along a contour that matches the junction contour,

producing the shell based on the model utilizing a rapid prototyping technique,

polishing the shell,

assembling the shell and the respective face plate, and

inserting the component.

15 17. A hearing aid for insertion in the auditory canal, comprising a hearing aid housing with a face plate comprising positioning means for engaging with corresponding positioning means of the shell so that the circumference of the face plate matches the junction contour of the shell when the face plate positioning means engage with the shell positioning means.

18. A hearing aid according to claim 17, wherein the face plate positioning means comprise at
20 least one face plate protrusion at the inner surface of the face plate, wherein the shell positioning means comprise indentations that are adapted to receive and match the at least one face plate protrusion, and further comprising the step of cutting the face plate along the junction contour so that it matches the junction contour when the at least one face plate protrusion are received by the mating indentations of the shell whereby correct assembly of
25 the face plate and the shell is facilitated.

19. A hearing aid according to claim 17, wherein the face plate positioning means comprise at least one face plate protrusion at the inner surface of the face plate terminating at the circumference of the face plate at a distance from the circumference that is substantially

equal to the thickness of the shell at the junction contour, and wherein the shell positioning means comprise the shell at the junction contour.

20. A hearing aid according to claim 19, wherein the shell positioning means further comprise protrusions at the junction contour extending inwardly towards the interior of the shell for reception and holding corresponding face plate protrusions.

specifies

21. A hearing aid for insertion in the auditory canal, comprising a hearing aid housing with an integrated face plate having engaging means for receiving and holding a hearing aid component, and a shell that is matched to the auditory canal of a user.

22. A hearing aid according to claim 17, comprising an electronic module with a socket, at least one microphone, a signal processor, and a receiver, and wherein the hearing aid housing is adapted to enclose the electronic module, the face plate has a battery opening defined therein for passage of a battery and the electronic module, and the socket constitutes the hearing aid component.

23. A hearing aid according to claim 22, wherein the engaging means comprise grooves, tracks and/or notches for engagement with co-operating socket engaging means formed on the socket.

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24. A hearing aid according to claim 23, wherein the socket engaging means comprise elastically resilient lugs.

25. A hearing aid according to claim 24, wherein the lugs are integrated with battery terminals projecting from the socket.

26. A hearing aid according to claim 17, wherein the shell has an integrated ventilation channel.

27. A hearing aid according to claim 17, wherein the shell has an acoustic output opening that is adapted to receive and hold an ear wax guard.

28. A hearing aid according to claim 17, wherein the shell has a shell ventilation channel opening that is adapted to receive and hold an ear wax guard.

29. A hearing aid according to claim 27, wherein the hearing aid housing is produced with a pipe stub in the shell centered around the opening and extending inwardly in the shell and forming a bushing for insertion of the ear wax guard.

specifies

30. A hearing aid according to claim 27, wherein the hearing aid housing is produced with a recess in the shell covering an area around the opening and matching a collar of the ear wax guard or, matching a collar of a bushing to be inserted in the opening for reception and holding of the ear wax guard. *spec*
- 5 31. A hearing aid according to claim 17, wherein the shell is produced with a tightening protrusion that extends along the surface of the shell providing a tight seal against the auditory canal wall when the shell is inserted in the auditory canal.
32. A hearing aid according to claim 31, wherein the tightening protrusion is made of the same material as the shell and wherein the outer dimensions of the shell are increased to form the tightening protrusion.
- 10 33. A hearing aid according to claim 17, comprising a groove extending along the surface of the shell and encircling the shell having a cross-section with a shape and dimensions that match a desired tightening ring to be mounted in the produced shell and constituting a tightening protrusion.
- 15 34. A hearing aid according to claim 17, comprising a groove extending along the surface of the shell for deposition of a material different from the material of the shell in the groove, the deposited material constituting a tightening protrusion.
35. A hearing aid according to claim 31, wherein the position of the tightening protrusion corresponds to the position in the auditory canal at which the dynamic variations of the dimensions of the auditory canal exhibit the least variations caused by user activity.
- 20 36. A hearing aid according to claim 17, wherein the shell is produced with means for vibration absorbing suspension of the receiver.
37. A hearing aid according to claim 36, wherein the means for vibration absorbing suspension of the receiver comprises a chamber or shell protrusions for receiving and holding the receiver, and at least one resilient band fixed around the receiver.
- 25 38. A hearing aid according to claim 37, wherein the at least one resilient band has at least one protrusions for supporting and suspending the receiver in the chamber.

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